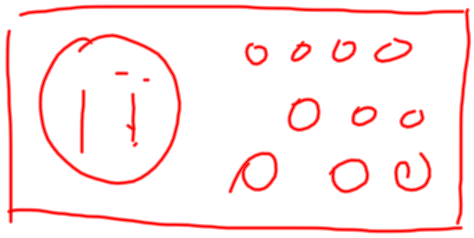
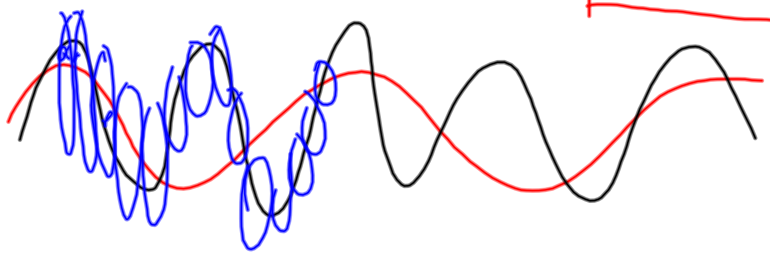
π 3.141592

Oscilloscope





there are 10 types of people
in the world -
those who know binary
and those who don't

base ten : $0,1,2,3,4,5,6,7,8,9,\underbrace{10}_{\text{1 ten and 0 ones}}, \ldots$

binary : base 2 : $0,1,\underbrace{10}_{\text{1 two and 0 ones}},11,100,101,110,111,1000, \ldots$

$\rightarrow$ transistors

6.8
5

$$\int_0^1 (2x+1)^4\,dx$$

$\int (2x+1)^4$

Not a basic rule....

I think I'll head towards the power rule

and, besides, the 2x+1 in parentheses is messing everything up

Let $u = 2x+1$

$$\frac{du}{dx} = 2$$

$du = 2dx$ or... $\frac{1}{2}du = dx$

and... when $x=0$

$u = 2x+1 = 1$

when $x=1$

$u = 2(1)+1 = 3$

same number as

$$\frac{1}{2}\int_1^3 u^4\,du$$

and this is power-rule doable

Jan 15-7:42 AM

6.8 | 10110

$$\int_{e^{-6}}^{e^{6}} \frac{\sqrt{36-(\ln x)^2}}{x}\,dx \quad \int_{-6}^{6} \sqrt{36-u^2}\,du$$

$u = \ln x$

$\frac{du}{dx} = \frac{1}{x}$

$du = \frac{1}{x}dx$

$x = e^{-6} \Rightarrow u = \ln(e^{-6}) = -6$

$x = e^{6} \Rightarrow u = \ln(e^{6}) = 6$

$A = \left(\frac{1}{2}\pi r^2\right)$

$= 18\pi$

6.8) 1011

8 4 2 1

$$\frac{\left(\frac{a}{b}\right)}{c} = \frac{a}{b \cdot c}$$

$$\int_0^{\frac{\pi}{2}} \underline{4} \sin\left(\frac{x}{2}\right) dx$$

$u = \frac{x}{2}$

$du = \frac{1}{2} dx$

$2du = dx$

$x = 0 \Rightarrow u = 0$

$x = \frac{\pi}{2} \Rightarrow u = \left(\frac{\pi}{2}\right)\left(\frac{1}{2}\right) = \frac{\pi}{4}$

$\frac{\pi}{2} \cdot 2$

$\frac{\pi}{2} \div 2$

$$4 \cdot 2 \int_0^{\frac{\pi}{4}} \sin u \, du$$

$$= 8(-\cos u)\Big|_0^{\frac{\pi}{4}}$$

$$= 8\left[\left(-\frac{\sqrt{2}}{2}\right) - (-1)\right] = 8 - 4\sqrt{2}$$

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6.8/14 $\int_{1-\pi}^{1+\pi} \sec^2\left(\frac{1}{4}x - \frac{1}{4}\right)dx$

Let $u = \frac{1}{4}x - \frac{1}{4}$

[I know $\int \sec^2 u\, du$]

$du = \frac{1}{4}dx$

$\Rightarrow 4du = \underline{dx}$

$x = 1-\pi \Rightarrow u = \frac{1}{4}(1-\pi) - \frac{1}{4}$

$u = -\frac{\pi}{4}$

$x = 1+\pi \Rightarrow u = \frac{1}{4}(1+\pi) - \frac{1}{4}$

$= \frac{\pi}{4}$

6.8/18 $\int_{\ln 2}^{\ln(2/\sqrt{3})} \frac{e^{-x}}{\sqrt{1-e^{-2x}}}dx$

$u = e^{-x}$

$du = -e^{-x}dx$

so $\underbrace{(-du)}= e^{-x}dx$

$x = \ln 2 \Rightarrow u = e^{-(\ln 2)} = \frac{1}{e^{\ln 2}} = \frac{1}{2}$

$x = \ln\left(\frac{2}{\sqrt{3}}\right) \Rightarrow u = e^{-\left(\ln\frac{2}{\sqrt{3}}\right)} = \frac{1}{e^{\ln\frac{2}{\sqrt{3}}}} = \frac{\sqrt{3}}{2}$

$-\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{1}{\sqrt{1-u^2}}du$

Log rules

$\log_b x \cdot y = \log_b x + \log_b y$

$\log_b \frac{x}{y} = \log_b x - \log_b y$

logs convert between multiplication and addition

$\log_b x^y = y \log_b x$

logs convert between exponentiation and multiplication

$\log_b(b^x) = x$ and $b^{\log_b x} = x$

inverse properties (adjusted for notational peculiarities)

Jan 15-8:43 AM